

FACSIMILE TRANSMITTAL FORM	Application Number	10/666212
	Filing Date	September 18, 2003
	First Named Inventor	Rosenflanz, Anatoly Z.
	Art Unit	1755
	Examiner Name	Karl E. Group
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Total Number of Pages in This Submission:		8
Date: February 9, 2006	Attorney for Applicant: Gregory D. Allen	

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First Named Inventor: ROSENFLANZ, ANATOLY Z.

Application No.: 10/666212

Group Art Unit: 1755

Filed: September 18, 2003

Examiner: Karl E. Group

Title: CERAMICS COMPRISING AL₂O₃, REO, ZRO₂ AND/OR HFO₂, AND
NB₂O₅ AND/OR TA₂O₅ AND METHODS OF MAKING THE SAMECOMMUNICATION REGARDING THE AMENDMENT AND RESPONSEUNDER 37 CFR § 1.111 DATED FEBRUARY 6, 2006Mail Stop: Amendment
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Dear Sir:

In reviewing the instant Amendment and Response, it is believed that the following documents:

(a) *Phase Diagrams for Ceramists*, Ernest M. Levin, et al., Figs. 771-775, 1964.

(b) *Phase Diagrams for Ceramists 1975 Supplement*, Ernest M. Levin, et al., Figs. 4446-4448, 1975.

referred to on the bottom of page 19 and the top of page 20, were inadvertently not included with such paper. Enclosed herewith are these two documents.

Application No.: 10/666212

Case No.: 58807US002

It is believed that no extension of time or fee is due; however, in the event an extension of time is necessary, it is hereby requested, and in the event a fee is required, please charge the fee to Deposit Account No. 13-3723.

Respectfully submitted,

February 9, 2006
Date

By:

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Phase Diagrams for Ceramists 1975 Supplement

Ernest M. Levin and
Howard F. McMurdie

Compiled at the National Bureau of Standards

Margie K. Reser, *Editor*

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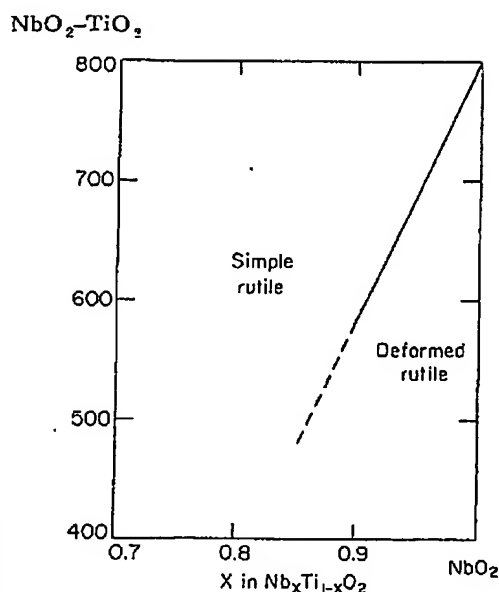


FIG. 4446.—System Nb_xTi_{1-x}O₂, showing phase transition temperature.

K. Sakata, *J. Phys. Soc. Jap.*, 26 [4] 1067 (1969).

Five mixtures of NbO₂ and TiO₂ powders (purity unspecified) were prepared by sealing them under vacuum in a fused-SiO₂ tube and heating them for 1 day at 650° and 2 days at 950°. Phase analysis was conducted by means of X-ray diffraction and DTA.

The entire system constitutes a continuous solid-solution series in which the normal rutile phase was identified for $0 < x < 0.85$ and the deformed rutile for $0.85 < x$ at room temperature. In the plot of lattice parameters as a function of composition, c shows a maximum, reflecting a competition between expansion caused by substitution of Nb⁴⁺ for Ti⁴⁺ and contraction resulting from the formation of Nb-Nb pair bonds in the lattice. For $x \approx 0.85$, the X-ray diffraction patterns show superstructure reflections which characterize the deformed rutile-type structure, whereas by DTA no thermal effects were observed.

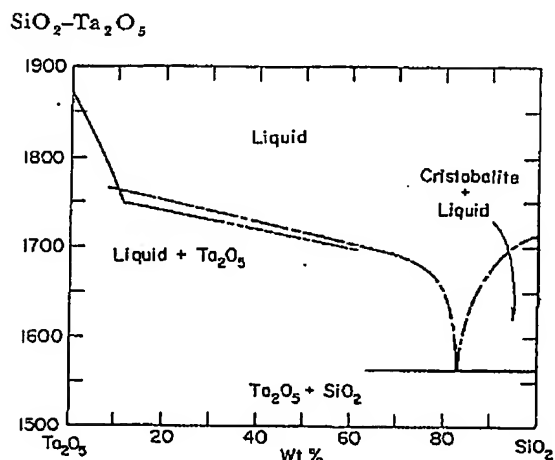


FIG. 4447.—System Ta₂O₅-SiO₂. Dash-dot curve is after E. A. Bush, Progress Reports Nos. 1 and 2, Department of Ceramic

Technology, Pennsylvania State University, University Park, PA, 1964.

D. A. Reeve and N. F. H. Bright, *J. Amer. Ceram. Soc.*, 52 [8] 407 (1969).

The liquidus curve near the Ta₂O₅ component was determined from data for 8 compositions using a Griffin-Telin hot-stage microscope modified for 2 kinds of noble-metal thermocouples, as described in the commentary to Fig. 4316. Starting materials consisted of silicic acid (Analyzed Reagent, J. T. Baker Chemical Co.) and Ta₂O₅ (Fansteel Inc., C-200) with a stated purity of 99.9%. Mixtures were homogenized by pelletization followed by sintering at 1500° for 48 h, with intermediate grinding.

The liquidus curve of Bush (determined by strip-furnace measurements) extrapolated to 100% Ta₂O₅ gives 1785°, which is the reported mp of the low-temperature form.¹ According to Ref. 2 (Fig. 4448), the addition of SiO₂ (as well as WO₃, GeO₂, B₂O₃, and Al₂O₃) to Ta₂O₅ forms phases structurally similar to low Ta₂O₅, which are stable up to solidus temperatures. An alternate explanation for the increased stability of low Ta₂O₅ is solid solution of the added oxides. The sharp discontinuity in the liquidus at $\approx 1750^\circ$ is consistent with either hypothesis.

1. A. Reisman, R. Holtzberg, M. Berkenblit, and M. Berry, *J. Amer. Chem. Soc.*, 78 [18] 4514 (1956).

2. R. S. Roth and J. L. Waring, *J. Res. Nat. Bur. Stand., Sect. A*, 74 [4] 485 (1970).

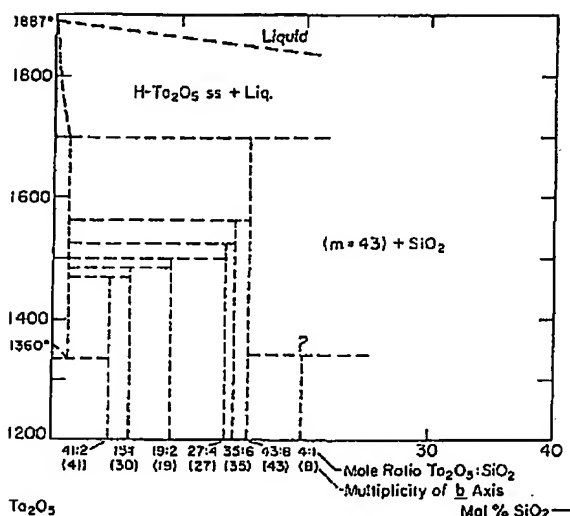


FIG. 4448.—System Ta₂O₅-SiO₂, showing Ta₂O₅-rich region. R. S. Roth and J. L. Waring, *J. Res. Nat. Bur. Stand., Sect. A*, 74 [4] 487 (1970).

Except for the following modifications, the materials, methods, and interpretation are similar to those for the companion Al₂O₃-Ta₂O₅ system (Fig. 4380). Four compositions containing 5, 10, 25, and 50% SiO₂ (reagent grade) were prepared with the Ta₂O₅ by the solid-state method. Final heat treatments were done in sealed Pt tubes at temperatures between 1325° and 1595° for 4.5 to 65 h, before quenching and examination by X-ray diffraction powder techniques. Although not shown on the diagram, it should be noted that the data may also be interpreted on the basis of a conventional solid-solution phase diagram. Figure 4447 shows the liquidus for the entire system.

Phase Diagrams for Ceramists

Ernest M. Levin,
Carl R. Robbins and
Howard F. McMurdie

Compiled at the National Bureau of Standards

Margie K. Reser, *Editor*

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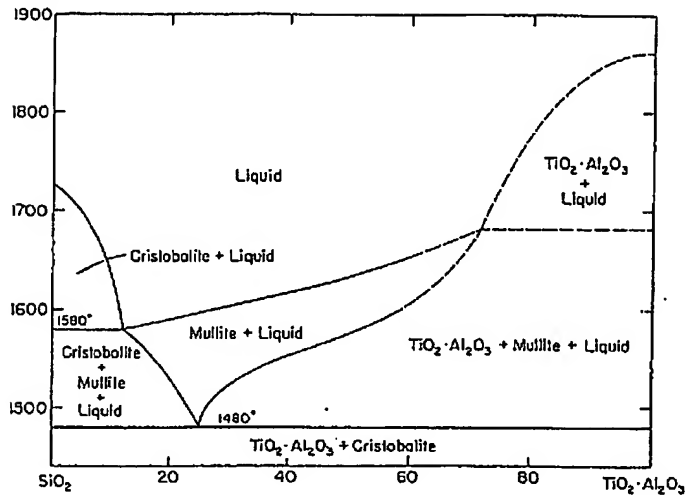
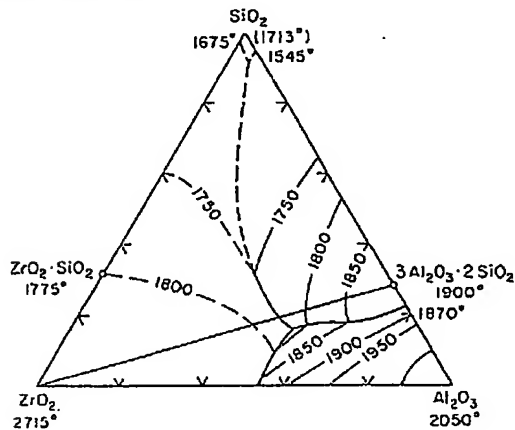
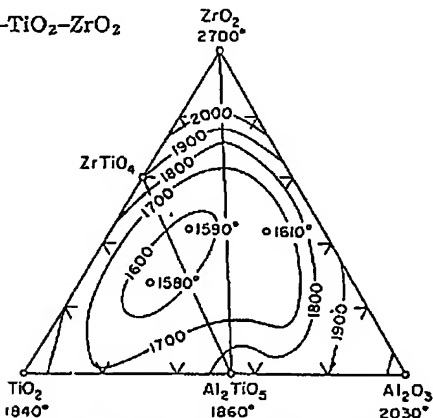
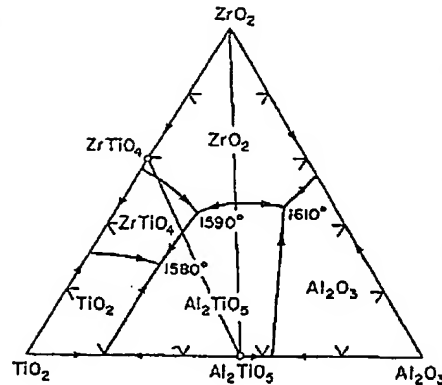
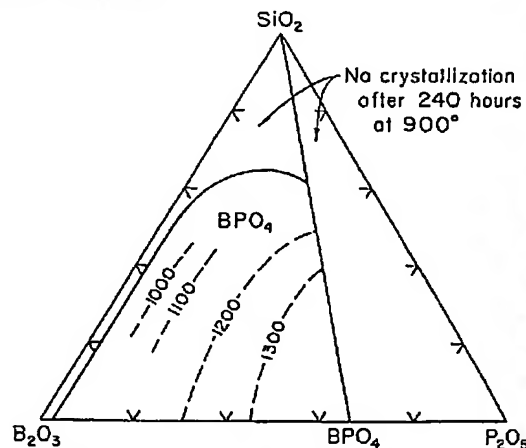
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Figs. 111-115

282

Metal Oxide Systems

 $\text{Al}_2\text{O}_3\text{-SiO}_2\text{-TiO}_2$ (concl.)FIG. 771.—System $\text{SiO}_2\text{-Al}_2\text{O}_3\text{-TiO}_2$.Y. M. Agamawi and J. White, *Trans. Brit. Ceram. Soc.*, 51, 810 (1951-52). $\text{Al}_2\text{O}_3\text{-SiO}_2\text{-ZrO}_2$ FIG. 772.—System $\text{Al}_2\text{O}_3\text{-SiO}_2\text{-ZrO}_2$.P. P. Budnikov and A. A. Litvakovskii, *Doklady Akad. Nauk S.S.S.R.*, 106, 268 (1956). $\text{Al}_2\text{O}_3\text{-TiO}_2\text{-ZrO}_2$ FIG. 773.—System $\text{Al}_2\text{O}_3\text{-TiO}_2\text{-ZrO}_2$; melting isotherms.A. S. Berezhnoi and N. V. Gul'ko, *Dopovidi Akad. Nauk Ukr. R.S.R.*, 1955 [1] 78.FIG. 774.—System $\text{Al}_2\text{O}_3\text{-TiO}_2\text{-ZrO}_2$; primary phases.A. S. Berezhnoi and N. V. Gul'ko, *Dopovidi Akad. Nauk Ukr. R.S.R.*, 1955 [1] 78. $\text{B}_2\text{O}_3\text{-SiO}_2\text{-P}_2\text{O}_5$ FIG. 775.—System $\text{B}_2\text{O}_3\text{-SiO}_2\text{-P}_2\text{O}_5$. Not true ternary at atmospheric pressure and temperature below 1400°C because of retained water.W. J. Engler and P. A. Hummel, *J. Soc. Glass Technol.*, 39, 126T (1955).